Self-Guided Multimedia Stress Management and Resilience Training

Completed Technology Project (2013 - 2018)

Project Introduction

Stress and anxiety-related problems are some of the most common and costly behavioral health problems in society. For those working in operational environments (i.e., astronauts, flight controllers, military), stress and anxiety-related problems before, during, or after missions can seriously compromise efficiency, safety, and performance. To address behavioral health issues like stress, it is important to maximize the privacy, validity, and acceptability of the training and countermeasures used. Technology-based behavioral health programs (e.g., computer or web-based programs) are effective for treating behavioral health problems. These programs increase availability of evidence-based interventions to individuals who are not able or willing to receive such in-person treatments. Our prior research validated the autonomous multimedia resilience training program we created (i.e., Stress Management and Resilience Training for Optimal Performance; SMART-OP). SMART-OP interactively trains users to manage stress and build resilience over 6 weekly training sessions lasting approximately 45 minutes each. Results from a randomized controlled trial with a stressed but otherwise healthy sample (N=66) indicated that SMART-OP decreased perceived stress, improved perceived control over stress, and was rated as significantly more useful than an attention control group that received marketed videos and published material on stress management. SMART-OP was also rated as "excellent" in terms of user-friendliness, acceptability, and had low dropout, and high homework adherence. We propose to evaluate the effectiveness, usefulness, and usability of SMART-OP with a sample of flight controllers and instructors (including those in training flow) at Johnson Space Center (JSC) by comparing it to a Wait List Control group. Additionally, we will examine the effects of self-guided stress management and resilience training on biomarkers for stress (i.e., cortisol, a-amylase), heart rate, and cognitive and behavioral performance. Based on several meetings with the Space Flight Resource Management (SFRM) Working Group, we learned that trainees are not progressing through the training flow satisfactorily and that they identified stress as a potential contributor to poor trainee performance. Additionally, stress was identified as an area of concern to address with flight controller and instructors. Since SMART-OP significantly reduced perceived stress, increased perceived control over stressors, and was rated as highly useful, SMART-OP could provide helpful stress management training for flight controllers. Also, since SMART-OP is evidence-based, confidential, and self-directed, it may be more acceptable to flight controller trainees than other programs.

Anticipated Benefits

An important aspect of the research that NASA supports is the potential applications on Earth and benefits to society in general. Stress-related health and mental problems are among the most common and costly in the country. Further validation and development of SMART-OP can help potential further dissemination of the program to other populations, for example, those who

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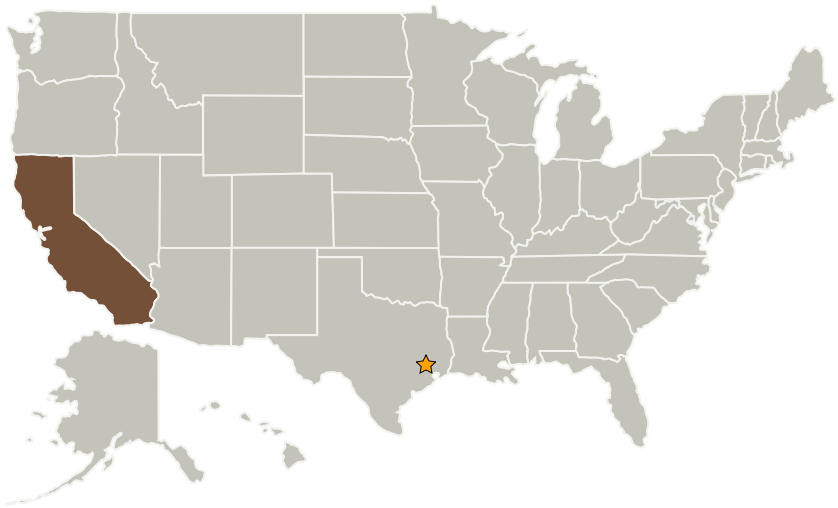
work in operational settings (e.g., military, police, medical personnel), including their family members, or to those who lead stressful lives (which could be applicable to nearly any individual). SMART-OP could have significant impact on Earth in helping people manage the deleterious effects of stress thereby addressing a major aspect of the important work that NASA pursues and supports.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
University of Southern California(USC)	Supporting Organization	Academia Asian American Native American Pacific Islander (AANAPISI)	Los Angeles, California

Primary U.S. Work Locations
California

Organizational Responsibility

Responsible Mission Directorate:

Space Operations Mission Directorate (SOMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Human Spaceflight Capabilities

Project Management

Program Director:

David K Baumann

Project Manager:

Thomas J Williams

Principal Investigator:

Raphael D Rose

Co-Investigators:

Scott A Smith
Michelle Craske

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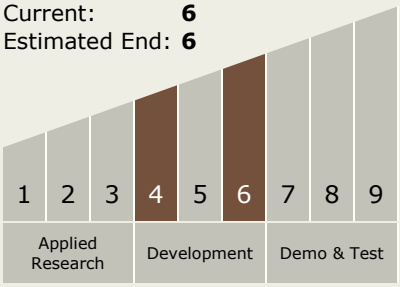
Project Transitions

December 2013: Project Start

Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.3 Human Health and Performance
    - TX06.3.3 Behavioral Health and Performance

Target Destinations

The Moon, Mars

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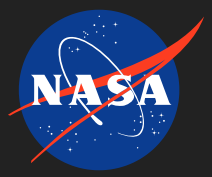

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June 2018: Closed out

Closeout Summary: In the present study, we evaluated the effectiveness, usefulness, and usability of SMART-OP with a sample of flight controllers, trainees, and directors at Johnson Space Center (JSC) in a randomized controlled trial (RCT) by comparing SMART-OP to a wait-list condition (WLC). Evaluating SMART-OP with this population at JSC provided us the opportunity to assess the program's use with an operationally focused analogous sample to astronauts. We hypothesized that participants in the SMART-OP group would show significantly lower perceived stress, higher perceived control of stress, and increased resilience based on measures of self-report than the WLC from pre- to post-assessment. We also hypothesized that participants would rate the program as very useful and easy to use. Our second aim was to provide feedback to SFRM and FOD (Flight Operations Directorate) based on data from the RCT and suggest modifications and implementation strategies of SMART-OP for use with astronauts. The main deliverable of our task was to provide data on the effectiveness, usefulness, and usability of a self-guided, multimedia, stress management and resilience training program as tested in an RCT with flight controllers. The outcome data on perceived stress and perceived control over stress provides information on the efficacy of such training in helping to alleviate stress, a problem identified by SFRM working group in the training flow of flight controllers. Data on the usefulness and usability of SMART-OP will provide important information on the acceptability of self-guided multimedia behavioral health training with individuals who work in operational settings. For additional sources of data, we collected stress biomarker and heart rate data and had participants perform an acute stressor/frustrating task and measure neurocognitive performance. This data will inform future potential applications of such training with other individuals at JSC working in stressful environments including astronauts. Since this is the last task report for this study, we are presenting task progress since the last report period from the end of 2017 as well as a summary of task progress over the course of the 4 years. Since the last report, recruitment was completed at the end of December 2017 and we wrapped up running the remaining subjects (approximately N=10) through the study protocol, which concluded in March 2018. The remainder of this last task period was spend organizing and cleaning data. The JSC Nutritional Biochemistry Lab conducted biomarker assays on saliva samples conducted over the course of the project and send those results to us. We closed out the assessments and organized a return of the equipment from JSC as well as all data retrieval via encrypted methods. Lastly, we spent this task period conducting analyses as well as writing up the final task report with study results and conclusions and began preparation for submitting a peer-reviewed manuscript. Over the course of the 4-year study 189 individuals expressed interest in participating. This was typically done by signing an interest sheet after presentation pitches about the study to different groups of flight controllers. Eighty-eight or 46% of those interested were screened for eligibility which means that over half of those interested in the study were never screened for study eligibility. The team at UCLA worked with NASA BHP (Behavioral Health & Performance) personnel over the course of the study to try to address the issues in recruitment and screening and while strides were made; unfortunately most of the people who expressed interest in participating were never screened. Of the 88 who were screened, 61 were eligible with the remaining 27 not eligible primarily due to having too low stress scores. Of the eligible 61, 45 individuals completed pre-assessment and were randomized to one of our two conditions. Twenty-four participants were randomized to the SMART-OP condition, and 21 participants were randomized to the wait-list condition (WLC). Forty-one participants completed the first post-assessment, 20 from SMART-OP and 21 from WLC which constituted the main outcome comparison groups. Sixteen participants from the WLC completed a second post-assessment after they completed SMART-OP sessions, for a total of 37 final post-assessments. It should be noted that this was the first study to utilize the BHP Lab facilities and organizational structure; thus, there was steep learning curve to implementing this project. Many valuable lessons were learned over the course of this study in terms of subject recruitment that will ideally help future similarly conducted research.

Stories

Articles in Peer-reviewed Journals
(https://techport.nasa.gov/file/54067)

Project Website:

https://taskbook.nasaprs.com